Acknowledgements: I thank Dr M. Louette, Koninklijk Museum voor Midden Afrika, Tervuren, for access to collections made during the Belgian Zoological Expeditions to the Comoros, and for critical comments on an earlier draft. My field study was supported by a Frank M. Chapman Memorial Fund grant.

References:

Barth, E. K. 1967. Standard body measurements in *Larus argentatus, L. fuscus, L. canus* and *L. marinus. Nytt Mag. Zool.* 14: 7–83.

Benson, C. W., Beamish, H. H., Jouanin, C., Salvan, J. & Watson, G. E. 1975. The birds of the Iles Glorieuses. *Atoll Res. Bull.* 176: 1–34.

Bjordal, H. 1983. Effects of deep freezing, freeze-drying and skinning on body dimensions of House Sparrows, *Passer domesticus. Fauna Norv. Ser. C, Cinclus* 6: 105–108.

Green, G. H. 1980. Decrease in wing length of skins of Ringed Plover and Dunlin. *Ringing & Migration* 3: 27–28.

Green, G. H. & Greenwood, J. J. D. (Eds). 1978. *Joint Biological Expedition to North-east Greenland 1974.* Dundee University north-east Greenland expedition.

Green, G. H. & Williams, A. E. 1974. Wading Birds. *In* O'Brien, R. M. G. & Greenwood, J. J. D. (Eds): *Report of the Dundee University north-east Greenland expedition in 1972.*

Greenwood, J. G. 1979. Post-mortem shrinkage of Dunlin *Calidris alpina* skins. *Bull. Brit. Orn. Cl.* 99(4): 143–145.

Haftorn, S. 1982. Variation in measurements of the Willow Tit *Parus montanus* together with a method for sexing live birds and data on the degree of shrinkage in size after skinning. *Fauna Norv. Ser. C, Cinclus* 5: 16–26.

Kelm, H. 1970. Beitrage zur Methodik des Flügelmessens. *J. Orn.* 111: 482–494.

Knox, A. 1980. Post-mortem changes in wing lengths and wing formulae. *Ringing & Migration* 3: 29–31.

Louette, M. & Herremans, M. In press. Taxonomy and evolution in the bulbuls *(Hypsipetes)* on the Comoro Islands. *Bonn. Zool. Beitr.*

Prater, A. J., Marchant, J. H. & Vuorinen, J. 1977. *Guide to the Identification and Ageing of Holarctic Waders.* British Trust for Ornithology.

Summers, R. 1976, The value of bill lengths of museum specimens in biometric studies. *Wader Study Group Bulletin* 17: 10–11.

Vepsäläinen, K. 1968. Wing length of Lapwing *Vanellus vanellus* before and after skinning with remarks on measuring methods. *Ornis Fennica* 45: 124–126.

West, G. C., Savage, S., Irving, L. & Peyton, L. J. 1968. Morphological homogeneity of a population of Alaska Willow Ptarmigan. *Condor* 70: 340–347.

Address: M. Herremans, Prinses Lydialaan 65, B-3030 Heverlee, Belgium.

Abnormal numbers of tail feathers

by D. B. Hanmer

Received 10 December 1984

Occasionally birds have been found to have abnormal numbers of rectrices (Stresemann & Stresemann 1966, Hanmer 1981, Somadikarta 1984).* In some there was a pair of rectrices either missing or additional, but more often there were unequal numbers on either side of the tail. Hence I propose ''anisorectricial'' to describe tails with an abnormal number of rectrices, that is with a number that is unequal to the normal or with an unequal number on the 2 sides, as opposed to ''polyrectricyly'' (Somadikarta 1984).

*''Ed Mr Geo. A. Smith informs me that the oldest reference for an abnormal number of tail feathers may be the copper-plate engraving of the Carolina Conures *Aratinga (Conuropsis) carolinensis* of Audubon's (1827-38) *The Birds of America.* In *Ornithological Biography* (1831) he tells how the upper bird in the illustration, a female, had '. . . 14 Tail feathers all 7 sizes distinct and firmly affixed in 14 different receptacles . . .' and that he drew it '. . . to verify one of those astonishing fits of Nature . . .'.''

TABLE 1

Anisorectricial specimens of birds from Nchalo, Malawi and Mopeia, Mozambique

Species	No. examined	No. of anisorectricial birds 2 less	1 less	1 more	2 more	% abnormal
Non-passerines						
Streptopelia capicola	20			1		5.00
S. senegala	65		1	1		3.08
S. decipiens	57		1			1.75
Oena capensis	42			1		2.38
Turtur afer	53			1		1.89
T. chalcospilos	193		3	3		3.11
Treron australis	8				1	12.50
Caprimulgus fossii	173			2	2	2.31
Colius striatus	563	27	7			6.04
Urocolius indicus	85			1	4	5.88
Alcedo cristata	239			1		0.42
Ispidina picta	335		1			0.30
Halcyon leucocephala	82			1		1.22
Merops pusillus	387	1				0.26
Indicator minor	38	1				2.63
Passerines						
Pycnonotus barbatus	779		4	4	1	1.16
Phyllastrephus terrestris	188		1			0.53
Andropadus importunus	792	2	4			0.76
Cossypha natalensis	68			2		2.94
C. heuglini	50		1			2.00

Species	No. examined	No. of anisorectricial birds 2 less	1 less	1 more	2 more	% abnormal
Passerines (cont.)						
Acrocephalus arundinaceus	406		1			0.25
A. palustris	180		1			0.56
A. gracilirostris	191		1	1		1.05
Cisticola brachyptera	62		1			1.61
C. erythrops	135		1			0.74
Prinia subflava	54			1		1.85
Terpsiphone viridis	238		1			0.42
Platysteira peltata	37	1				2.70
Nectarinia cuprea	288			2		0.69
N. venusta	207	1				0.48
N. talatala	162		1			0.62
N. senegala	318		1	1		0.63
Passer griseus	51		1			1.96
Ploceus intermedius	930		1	1		0.22
P. cucullatus	1135		5	1		0.44
P. subaureus	297		1			0.34
P. xanthopterus	2238		4	1		0.22
P. velatus	413	1		1		0.48
Amblyospiza albifrons	325		4	1		1.54
Euplectes orix	1501		1	1		0.13
E. capensis	189				1	0.53
Lagonosticta rhodopareia	250		1			0.40
L. senegala	381	1	1			0.52
Uraeginthus angolensis	529			1		0.19
Serinus sulphuratus	234		2			0.85

At Nchalo, Malawi (16°16′S, 34°55′E), c. 20,300 birds have been handled and 115 of 42 species were anisorectricial, though there may have been more, since rectrices were not always counted when no moult was in progress. However, among the 7200 recaptures, which were usually more carefully examined, few anisorectricial cases were found which had not already been noted, so that probably few cases were overlooked. At Mopeia, Mozambique (17°56′S, 35°37′E), 2500 birds were handled and 11 birds of 8 species were found to be anisorectricial. All 126 individuals of 45 species are included in Table 1.

Among the non-passerines, extra rectrices were more common than absent ones, except in the Speckled Mousebird *Colius striatus* (see below). Passerines more commonly had a reduced number of rectrices, but extra ones were found in 20 birds.

TABLE 2

Families (and genera) in which anisorectricial birds were found at Nchalo, Malawi and Mopeia, Mozambique

Family (and genus)	No. examined	No. aberrant	% aberrant
Columbidae	455	12	2.64
Treronidae	8	1	12.50
Caprimulgidae	180	4	2.22
Coliidae	648	49	6.02
Alcedinidae	757	3	0.40
Meropidae	505	1	0.20
Indicatoridae	52	1	1.92
Pycnonotidae	1793	16	0.89
Turdidae	268	3	1.12
Sylvidae	2383	6	0.25
(Acrocephalus	1258	4	0.32)
(Cisticola	329	2	0.61)
Priniidae	54	1	1.85
Muscicapidae	348	2	0.57
Nectariniidae	1304	6	0.46
Ploceidae	7979	25	0.31
(Passer	139	1	0.72)
(Ploceus	5113	16	0.31)
(Amblyospiza	325	5	1.54)
(Euplectes	1933	3	0.16)
Estrildinidae	2530	4	0.16
Fringilidae	420	2	0.48

The Red-faced Mousebird *Urocolius indicus* at Nchalo appears to have evolved 10 rectrices as the normal, since only 5 (5.88%) were found with 11 or 12. On the other hand, the Speckled Mousebird, although still usually found with 12, had only 10 or 11 in 34 (6.04%) birds. In these species the extra or missing rectrices were always one or both of the outermost pair, which may, therefore, no longer be a functional necessity. In all the other species it is not known which rectrices were the aberrant ones, since the rectrices on either side of the central pair remained evenly spaced across the pygostyle, slightly more spaced out if there were too few and more cramped where there was an extra rectrix. The central pair was never found to be aberrant.

Table 2 lists the families in which anisorectricial birds were found. In certain families the percentage of birds which were anisorectricial was higher than the

average for all specimens, namely 0.55%. If the mousebirds are excluded, since the very high percentage of abnormalities in the 2 species suggests that a different process may be involved to that causing abnormalities in other families, the average is only 0.35%. However, in many of these families only one bird of one species has been found to be anisorectricial and where only small numbers of a species or family have been caught, the high percentage is probably not a valid figure; one would not, for example, expect one Green Pigeon *Treron australis* in every 9 to have 14 rectrices. The families in which anisorectricial birds seem to be fairly common, apart from the Coliidae, are the doves Columbidae, one species of nightjar Caprimulgidae, bulbuls Pycnonotidae, sunbirds Nectariniidae, some species of weaver Ploceidae and possibly the robin-chats Turdidae.

The cause of this abnormality is unknown, although in the prinia and nightjar, which normally have only 10 rectrices, extra ones could be of phylogenetic origin. The mousebirds at Nchalo appear to be undergoing a genetic reduction, just starting in the Speckled Mousebird and probably of recent origin in the Red-faced Mousebird (*vide* the high percentage still with 11 or 12 rectrices). Elsewhere the Red-faced Mousebird apparently normally still has 12 rectrices, as R. K. Brooke informs me he has found only 2 with 10 rectrices. A Scarlet-chested Sunbird *Nectarinia senegala* probably had some congenital abnormality, as it had 10 rectrices normally placed on the pygostyle, plus 2 extra on one side and one on the other, 2 mm distant from the rest of the rectrices and growing from the skin at the base of the pygostyle. A possibly hereditary aberration occurred in a female Sombre Bulbul *Andropadus importunus* and her chick which both had 11 rectrices. Another Sombre Bulbul, not included among the 126 aberrant birds, had only 9 rectrices, but there appeared to be some scar tissue on the pygostyle, so that this abnormality presumably had been caused by injury.

Despite fairly large numbers having been examined (a total of c. 3000), no members of the cuckoos Cuculidae, woodpeckers Picidae, swallows Hirundinidae, cuckoo-shrikes Campephagidae, drongos Dicruridae, orioles Oriolidae, pipits and wagtails Motacillidae, shrikes Lanidae and parasitic finches *Vidua* have found to be anisorectricial, although this does not exclude its occurrence.

Hanmer (1981) gave the percentage of anisorectricial birds at Mopeia and Nchalo up to the middle of 1981 as 0.6% (actually 0.55%). (It should be noted that the total number of birds handled (20,500) was given in error for the number of different individuals handled (17,000), although the percentage was correctly calculated from the latter figure.) The present paper includes all those cases found up to 1981, together with those found in the following 3½ years and the result is identical, while the families in which a higher than normal proportion was anisorectricial remained the same as prior to 1981.

Few of the abnormal birds have been retrapped after one or more complete moults, but 6 which were examined a year or more later were found still to be anisorectricial; 2 Black-eyed Bulbuls *Pycnonotus barbatus,* one Sombre Bulbul and 3 Brown-throated Weavers *Ploceus xanthopterus.* This supports the suggestion that the condition is constant in the life of the bird concerned.

In addition to the anisorectricial birds found at Mopeia and Nchalo, 3 South African Sacred Ibis *Threskiornis aethiopicus* had 13 rectrices (Lowe *et al.* in press), one South African Martial Eagle *Polemaetus bellicosus* had 11 and 2

Red-faced Mousebirds had 10 (R. K. Brooke) and 2 Antarctic Pintado Petrels *Daption capense* had 15 instead of 14 (Bierman & Voous 1950). Broekhuizen & Liversidge (1954) examined the tails of 3682 South African Gannets *Morus capensis,* but make no mention of anisorectricial individuals, so presumably they do not occur (or very seldom) in this species. Odd numbers of rectrices are not rare in swans and some other birds (Newton 1896). C. S. Roselaar in Cramp & Simmons (1977) states that in the Mute Swan *Cygnus olor* and Bewick's Swan *C. columbianus* the number of rectrices varies between 20 and 24, but that it is "always" 20 in the Whooper Swan *C. cygnus.*

Newton (1896) suggests that since tail feathers are always paired, it seems reasonable to assume, where one of a pair is missing, that the germ of the missing feather has died due to injury. This seems indeed possible and could be the cause of the abnormality found in many of the anisorectricial birds at Nchalo and Mopeia; but it does not explain extra tail feathers.

Acknowledgements: I wish to thank R. K. Brooke for his assistance with this paper and for the references to anisorectricial birds which he has found in the literature. I am also very grateful to Dr J. F. Monk for his comments on an earlier draft.

References:

Bierman, W. H. & Voous, K. H. 1950. Birds observed and collected during the whaling expedition of the "Willem Barendsz" in the Antarctic, 1946-1947 and 1947-1948. *Ardea* 37 suppl. Pp. 1–123.

Broekhuizen, G. J. & Liversidge, R. 1954. Colour variation in the tail feathers of the South African Gannet *Morus capensis. Ostrich* 25: 19–22.

Cramp, S. & Simmons, K. E. L. 1977. *The Birds of the Western Palearctic.* Vol. 1. Oxford University Press.

Hanmer, D. B. 1981. Abnormal numbers of rectrices. *Safring News* 10: 3–5.

Lowe, K. A., Clark, A. & Clark, R. A. Body measurements, plumage and moult of the Sacred Ibis in South Africa. *Ostrich* in press.

Newton, A. 1896. *A Dictionary of Birds.* London.

Stresemann, E. & Stresemann, V. 1966. Die Mauser der Voegel. *J. Orn.* (Sonderheft): viii + 448 pp.

Somadikarta, S. 1984. Polyrectricyly. *Bull.Brit.Orn.Cl.* 104: 60–61.

Address: Mrs D. B. Hanmer, Sucoma, P/Bag 50, Blantyre, Malawi.

Further examples of abnormal rectrices and a case of an extra primary

by David S. Melville

Received 8 January 1985

Somadikarta (1984) reported the occurrence of additional rectrices, which he termed polyrectricyly, in 14 species of birds. However he overlooked a paper by Hanmer (1981), who has since reported (1985, this issue) that additional or missing rectrices were found in 0.55% of some 22,800 birds caught for ringing in East Africa, describing such birds as anisorectricial. Extra rectrices also have been recorded in various other species including Mute Swan *Cygnus olor,* Greylag Goose *Anser anser,* Canada Goose *Branta canadensis,* Wigeon *Anas penelope,* Gadwall, *A. strepera,* Mallard *A. platyrhynchos,* Capercaillie *Tetrao urogallus,* Quail *Coturnix coturnix,* Coot *Fulica atra,* Stone Curlew